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Nuclear Fundamentals Orientation Module 1

Nuclear Weapons Deterrence Concepts



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Nuclear Weapons Deterrence Concepts



Presentation Overview:

- Defining Deterrence
 - And Why it Matters
- Deterrence Today
 - Challenges of Great Power Competition and Multi-Polar Nuclear Interaction
- Deterrence and Our Mission
 - Science underpins Deterrence
- Questions and Answers

A Working Definition

- Deterrence is the **manipulation of an adversary's estimation** of the **cost/benefit calculation** of taking a given action.
- Deterrence consists of **two basic components**:
 - **the expressed intention** to defend a certain interest;
 - **the demonstrated capability** to achieve the defense of the interest in question, or to inflict such a cost on the attacker that even if he should be able to gain his end, it would not seem worth the effort to him.
- Deterrence is **psychological, contextual**, and can be **paradoxical**.
- **Credibility is the lynchpin of deterrence**

Discouraging an action by instilling doubt or fear of the consequences

The Foundation of our National Defense

- Our security hedge in an uncertain world

“The U.S. **nuclear deterrent** has been the cornerstone of our national security and global stability for more than 70 years, and its credibility serves as the **ultimate insurance policy** against a nuclear attack.”

- Hon. Lisa Gordon-Hagerty, Former Under Secretary for Nuclear Security, DOE

“**Nuclear deterrence** is a top priority within the U.S. military. It's our singular, most important mission.”

- Gen Joseph Dunford, Former Chairman of the Joint Chiefs of Staff

“The **nuclear triad**: submarine-based, land-based, and air-delivered weapons — provide deterrence that has kept war from breaking out again since World War II. Redundancy within the triad is not an issue—it's critical.”

- Gen Mark A. Milley, Chairman of the Joint Chiefs of Staff

Why We're Here

Our nation uses nuclear weapons every day.

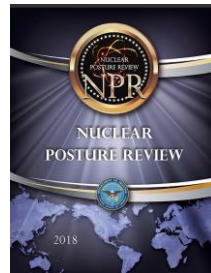
“A strong, continuing deterrent is critical to our nation's security. Nuclear war cannot be won, and therefore it must never be fought. And so, to preserve the peace we must be ready for war.”

- **Gen John Hyten, Vice Chairman, Joint Chiefs of Staff**



US Nuclear Triad –bombers , ICBMs, and ballistic missile submarines

Nuclear Deterrent Mechanisms



NUCLEAR DETERRENCE



**Policy
Strategy
Signaling**

**Flexible
Survivable
Complimentary**

**Strategic
messaging**

**Force
structure**

**EXPRESSED
INTENTION**

**DEMONSTRATED
CAPABILITY**

CREDIBILITY

Deterrence: What the Adversary Thinks It Is

“Perceptions” are the dominant variable.

- **Not necessarily** the classic, game theory form of **rationalist cost-benefit analysis**.
- But **instead** ...when deterrence succeeds it does so by creating a **subjective perception** in the minds of the adversary.
- “There is no one size fits all for deterrence.”

“I think the most important element of deterrence is not our view, but it’s what the adversary is thinking.”

- Gen. John Hyten, testimony before the HASSC on Strategic Forces, April, 2019

Deterrence Today: Great Power Competition, Multipolar Nuclear Interaction, Technology Challenges

▪ **Great Power Competitors**

- Russia and China

▪ **North Korea, Iran, Nuclear Proliferation**

- Rogue actors, regional threats, weapons & material

▪ **Technology and Deterrence**

- Adding complexity to an already complex problem

Deterrence today is more challenging than during the Cold War

Revisionist Russia: A Troublemaker with Nukes

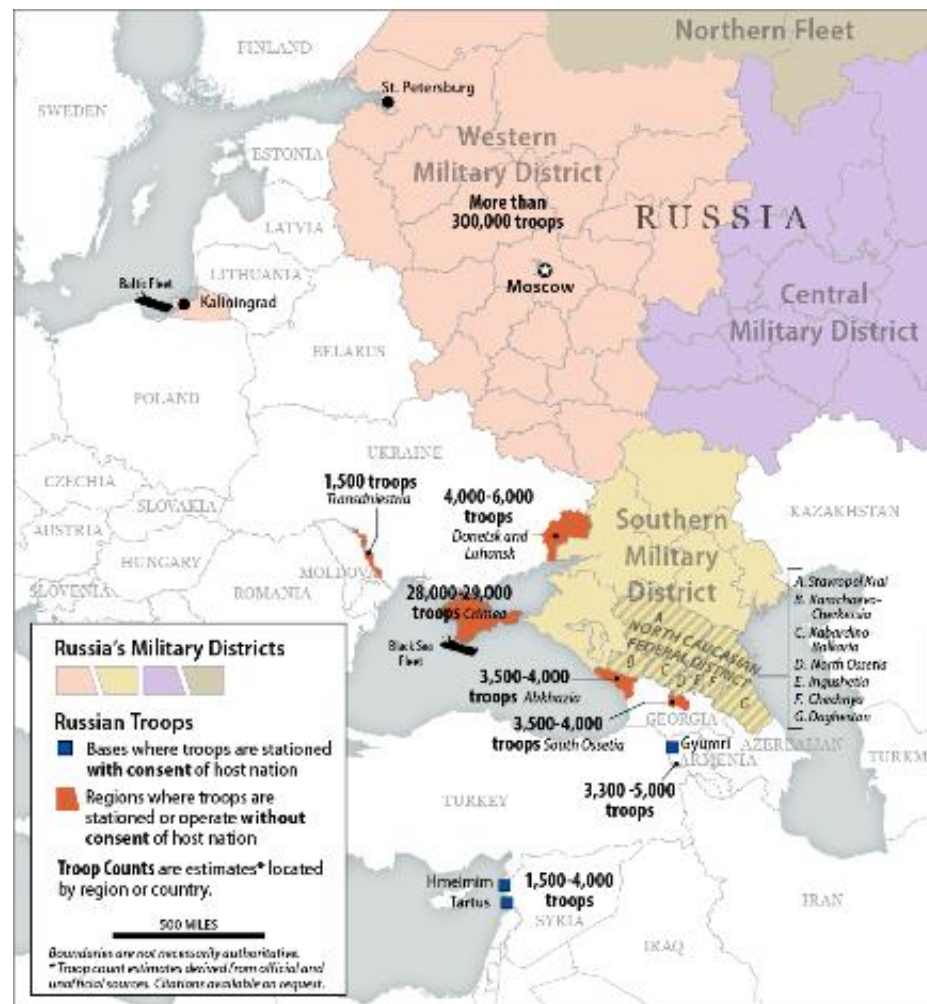
Military reform & modernization

- Streamlined command structures
- Improved readiness & training
- Ambitious acquisition program

Strategic forces

- Out with the old, in with the new
 - Triad modernization
 - Dual-capable systems

Substantially modernizing
and expanding capabilities



China: Crouching Tiger, Hidden Dragon

- Regional hegemony with a hard power component

Modernized military

- **Doctrine & training**
 - Fight and win “informatized local wars”
 - Joint force w/ expeditionary capabilities
- **Equipment**
 - Aircraft carrier, 5th gen fighters, nuclear subs
 - Standoff weapons
- **Strategic forces**
 - Minimum deterrent, survivable 2nd strike



A PRC constructed “artificial island,” Subi Reef in the contested Spratly Islands, South China Sea.

Anti-Access/Area Denial (A2/A)

“A period of strategic opportunity.”

Chinese leadership quoted in the DOD Annual Report to Congress,
18 May 2018

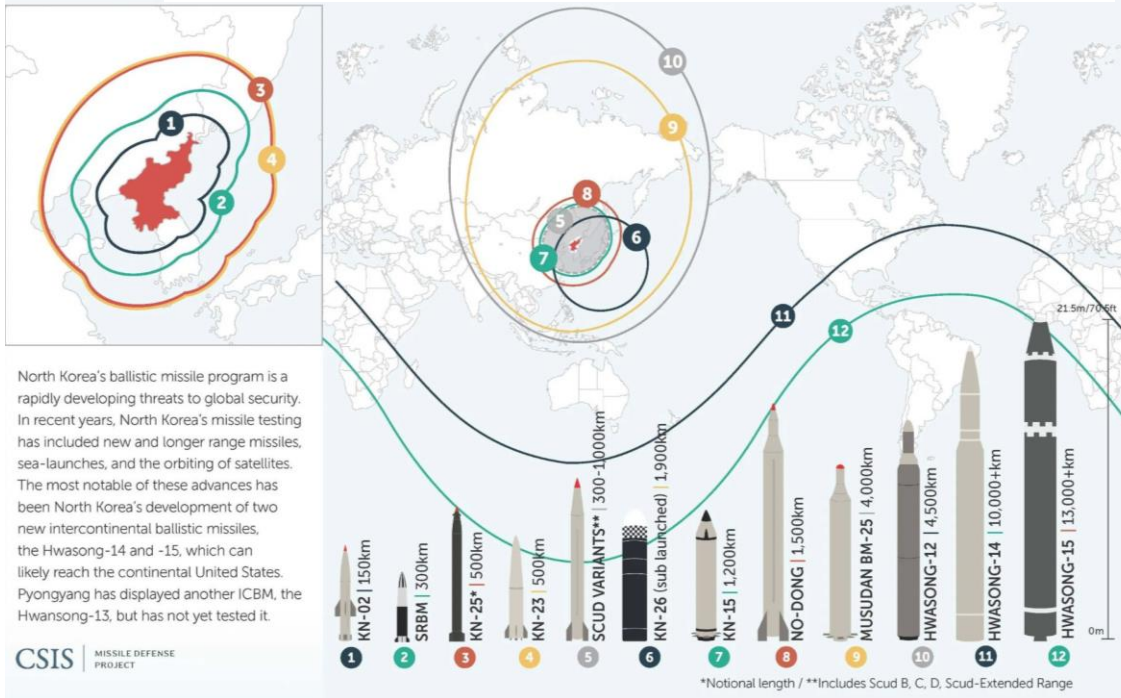
“The most comprehensive force restructuring in it’s history”

From the DOD Annual Report to Congress, 18 May 2018

North Korea, Iran, and Nuclear Proliferation



NORTH KOREA'S BALLISTIC MISSILES



IRANIAN NUCLEAR PROGRAM

- Capable of enriching uranium
- Ballistic missile technology
- “Shedding constraints” imposed by Iran nuclear deal

Robert Einhorn, "Averting a new Iranian Nuclear Crises," Policy 2020 Brookings, January 2020, https://www.brookings.edu/wp-content/uploads/2020/01/Einhorn_Policy2020_Averting-a-new-Iranian-nuclear-crisis.pdf

NUCLEAR PROLIFERATION

An enduring concern – rogue nations, non-state actors, etc.

Technology and Deterrence

Deterrence today: Technology's consequences?

- Advances in nuclear technology and support systems
- Emerging technologies like cyber and artificial intelligence
- Blurring the line between nuclear and non-nuclear capabilities

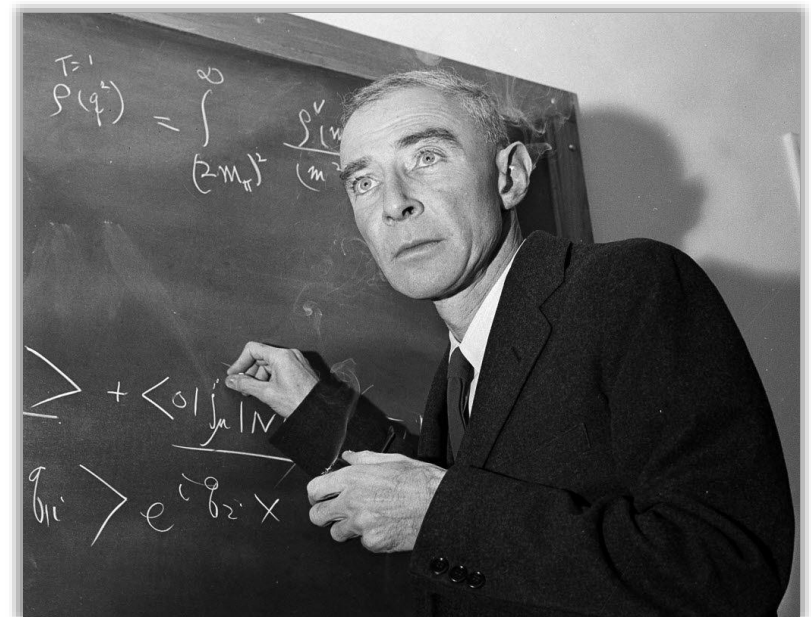


Russian hypersonic glide vehicle test
Dombarovsky, 26 Dec 2018

Deterrence and Our Mission

Science Underpins Deterrence

- **Effectiveness of the US deterrent**
 - Grounded in our scientific capabilities
- **Avoiding technological surprise**
 - Essential to national security
- **Stockpile stewardship** depends on “Cutting Edge Science.”



The power to nullify threats and counter attacks

Today's Deterrent Must be Resilient and Responsive

- **Must address** the growing threat of a return to **Great Power competition**
- **Responsive** – must become quick and agile
- **Resilient** – must be robust against advances by our adversaries

For NNSA labs and plants, this requires major enhancements in our ability to develop manufacturable and certifiable options

Concluding Thoughts on Deterrence

“A wise architect does not design only for benign environments, but for the worst weather conditions one can reasonably anticipate.”

- **Thomas Schelling, Nobel Prize winning nuclear strategist**

“We must always maintain the ability to **both reassure** our allies and **convince** potential aggressors *to choose **peace** rather than war*, **restraint** rather than escalation, and **conflict termination** rather than continuation.”

- **Adm. Richard Mies, former STRATCOM commander**

Summary

- Deterrence is about discouraging states/actors from taking unwanted actions – especially major war.
- Both credible will and capability are essential to deterrence.
- The adversary's perception is key.
 - of your credibility, will, & capability
- Deterrence is more challenging in today's multipolar world.

Thank you!

Questions?



Email us: NFO@lanl.gov

Deterrence may be the worst form of defense, except for all the others.